Patent claims

1. Force sensor based on an organic field effect transistor (10) applied on a substrate (1; 11), in which a mechanical force acting on the transistor causes a change in its source-drain voltage or its source-drain current (i_D) which corresponds to said force and which can in each case be detected as measurement quantity (V_{meas}, I_{meas}) for the acting force.

2. Force sensor according to Claim 1,
characterized
in that the organic field effect transistor (10) is a pentacene transistor having an active layer (5) made of pentacene between its source electrode (7) and its drain electrode (4).

3. Force sensor according to Claim 1 or 2,
characterized
in that the substrate (1) comprises for example glass, ceramic, plastic, a polymer film, metal film or paper.

4. Force sensor according to Claim 3,
characterized
in that the polymer film of the substrate (1) has, in particular, polyethylene napthalate (PEN), polyethylene terephthalate (PET), polyimide (PI), polycarbonate and/or polyethene ether ketones (PEEK).

5. Force sensor according to one of the preceding claims,
characterized
in that the detected measurement quantity (V_{meas}) is the drain-source voltage of the organic field effect transistor (10), a constant gate-source voltage ($V_{control}$) and a constant drain current ($I_{control}$) being present at said transistor at the measurement instant.

6. Force sensor according to one of Claims 1 to 4, characterized
in that the detected measurement quantity is the drain current (I_{meas}) of the organic field effect transistor (10), a constant gate-source voltage ($V_{control1}$) and a constant drain-source voltage ($V_{control2}$) being present at said transistor at the measurement instant.

7. Pressure sensor using at least one force sensor according to one of Claims 1 to 6, the substrate being configured as a deformable diaphragm (11) and the measurement quantity corresponding to the bending state of the diaphragm.

8. One- or two-dimensional position sensor for measuring the position of a mechanical force action along a line or within an area using a multiplicity of force sensors (10_1, 10_2, ..., 10_n) according to one of Claims 1 to 6, the force sensors (10_1, 10_2, ...,10_n) being arranged at regular distances from one another in the form of a one- or two-dimensional matrix on a common substrate.

9. One-dimensional position sensor according to Claim 9,
characterized
in that a driving and measuring unit (20) is connected or can be connected to the drain or source terminals of all the field effect transistors for the purpose of driving and detecting the position of the force action.

10. Two-dimensional position sensor according to Claim 9,
in which the organic field effect transistors are arranged in rows and columns and a driving and measuring unit (20) is connected or can be connected to the drain or source terminals of all the columns for

the purpose of driving and detecting the column position of the force action and a row decoder (21) is connected or can be connected to the gate terminals of the organic field effect transistors for row-by-row selection and driving of the organic field effect transistors.

11. Fingerprint sensor using a multiplicity of force sensors according to one of Claims 1 to 6 that are arranged on a common substrate at regular distances in the form of a two-dimensional matrix subdivided into rows and columns, in which case a driving and measuring unit (70) is connected or can be connected to the drain or source terminals of the organic field effect transistors in all columns for the purpose of driving and detecting the column position of the force action and a row decoder (21) is connected or can be connected to the gate terminals of the organic field effect transistors of all the rows for row-by-row selection and detection of the position of the force action in the row direction.

12. Fingerprint sensor according to Claim 11, characterized
in that at least one perspiration-resistant protective layer (30, 31; 32) as protection against the ingress of water and organic contaminations is provided above the active layer (5) of the organic field effect transistors.

13. Fingerprint sensor according to Claim 11, characterized
in that the protective layer comprises a perfluorinated material, in particular perfluorohexadecane.

14. Fingerprint sensor according to Claim 12, characterized

in that a first protective layer (30) comprises a hydrophobic material and a second protective layer (31) comprises a hydrophilic polymer which acts as a diffusion barrier against lipophilic contaminants.

15. Fingerprint sensor according to Claim 14, characterized
in that the first protective layer (30) covers the second protective layer (31).

16. Fingerprint sensor according to Claim 14, characterized
in that the second protective layer (31) covers the first protective layer (30).